

REMARKS

Claims 1-12 are pending in this application. Claims 1 and 7 have been amended.

Claim 1 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Yoshiki et al, U.S. Patent No. 5,843,236 in view of Shinji et al., JP 62-152127. This rejection is respectfully traversed.

Yoshiki et al. discloses that long slots 18b and 18c are located so as to be shifted from each other in a waveguide-axis direction by $(2n-1)/4$ (where n is a natural number) of a free-space wavelength λ_0 of microwave. Further, in Fig. 8 of Yoshiki et al, the longitudinal length of each sub-slot 80s is set to $1/2$ of the free-space length λ_0 of the microwave, and the subslots 80s are arrayed at intervals of $1/2$ of a guide wavelength λ_g of each microwave propagating within a rectangular waveguides 38 and 38'.

In contrast, in the present invention as recited in amended claim 1, a plurality of open areas each having at least one opening are disposed at an interval corresponding to a guide wavelength λ_g of standing waves of microwaves, so that microwaves in phase are introduced through the opening into a plasma generating chamber. That is, as described in the specification on page 10, lines 21 to 26, in a waveguide of a microwave introducing portion, first resonance units having a length $\lambda_g/2$ but not having the openings in the side and second resonance units have a length of $\lambda_g/2$ and having an opening in the side are alternately arranged sequentially from a terminal end portion. By that arrangement, an interval between the second resonance units which have the opening is λ_g (See Fig. 1A).

However, although Yoshiki et al. discloses having a plurality of slots (opening areas)(Figs. 1, 2, 8 of Yoshiki et al), the interval between the slots is $\lambda_g/2$,

which differs from the interval λ_g of the present invention. This difference is significant. In the present invention, because a phase of standing waves formed in the open areas are mutually arranged by setting the interval of the open areas to λ_g , same phase microwaves can be lead to the plasma generating chamber. However, in Yoshiki et al, because the interval of slots is $\lambda_g/2$, microwaves of reverse phase are led to the plasma generating chamber from the slot next to the slot from which the same phase microwaves are led.

In the present invention of amended claim 1, because the same phase microwave is led to the plasma generating chamber, the standing wave does not stand easily in the plasma generating chamber, and a space distribution of an intensity of the microwave becomes uniform. In contrast, in Yoshiki et al., both the same phase microwaves and the reverse phase microwaves are led, and a space distribution of an intensity of the microwave caused by interfering the same phase microwaves with the reverse phase microwaves is generated.

Thus, in the present invention of amended claim 1 and Yoshiki et al., configurations in order to achieve the objects of the invention are different, and effects by the configurations are also different. That is, Yoshiki et al and Shinji et al. (JP 62-152127) do not disclose the claimed feature that a plurality of open areas having at least one opening are disposed at an interval corresponding to the guide wavelength λ_g of the standing waves of the microwaves, so that microwaves in phase are introduced through the opening into the plasma generating chamber. Accordingly, claim 1 is not obvious over Yoshiki et al in view of Shinji et al.

Claim 7 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Yoshiki et al in view of Shinji et al, and Kou et al., U.S. Patent No. 6,246,175. This rejection is respectfully traversed.


Yoshiki et al, Shinji et al, and Kou et al do not disclose that a plurality of open areas having at least one second opening are disposed at an interval corresponding to the guide wavelength λ_g of the standing waves of the microwaves, so that microwaves in phase are introduced through a second opening into a plasma chamber. Accordingly, claim 7 is not obvious over Yoshiki et al in view of Shinji et al and Kou et al.

The dependent claims of the application, namely claims 2-6 and 8-12, have been rejected over Yoshiki et al. in view of various secondary references. These claims are submitted to be allowable for the reasons set forth above with respect to the independent claims from which they depend.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

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